

Science for Environment Policy

Local-scale ecological assessments contribute to conservation planning in an Italian Marine Protected Area

Assessing threats to biodiversity is necessary for effective spatial planning and balancing sustainable development with conservation. This study details a fine-scale assessment of the effect of a range of threats to coastline habitats within a Marine Protected Area (MPA) in the Mediterranean Sea. The study provides an example of how local-scale assessments can contribute to national conservation policy.

Threats to [marine ecosystems](#) in the Mediterranean Sea have been assessed at a landscape scale in order to inform conservation-planning. Many of these threats are based on expert judgement only, without direct measurement of real ecosystem impacts. Local-scale evaluations are important when MPAs are located within human-dominated landscapes, as they provide an opportunity to determine context-specific actions to maximise conservation efforts; for example, understanding how combined human pressures, such as tourism, maritime traffic and pollutant run-off from agricultural and urban areas, influences marine communities can facilitate identification of suitable sites for habitat restoration. Combinations of threats can lead to a range of impacts on marine ecosystems, such as the loss of [biodiversity](#) and changes in the physical structure of coastal habitats.

This study provides the first attempt to quantitatively assess how different combinations of threats impact on a stretch of coast where several human uses and conservation measures collide. The study was carried out in a densely populated area (south-west Apulia), which includes the MPA of Porto Cesareo, one of Italy's largest marine reserves. The MPA contains three Natura 2000 sites (SCIs - sites of community importance), established to ensure conservation of *Posidonia oceania* seagrass meadows, a critical habitat under the EU [Habitats Directive](#)¹.

The study included a local-scale assessment of the distribution and intensity of human threats to the MPA, combined with an ecological assessment of the actual impacts on two rocky reef habitat types (lower midlittoral and shallow infralittoral). Using GIS software the researchers divided the coastline into adjacent sectors. Benthic communities in both habitats were surveyed at random sampling points within the different sectors, through non-destructive methods (i.e. visual estimates). Threats were quantified for each sector on the basis of GIS-based information. The amount of [urbanised](#) and [agricultural](#) land was used as an indicator of several human influences on ecosystems, such as non-point sources of pollution (e.g. terrestrial run-off), coastal urbanisation and population pressure.

The substrate features of the coast, in terms of rocky, artificial and sandy coastline, were also assessed using GIS data. In particular, the proportion of sandy coastline was used as an indicator of high erosion rates indirectly caused by human interference with natural sedimentation regimes (e.g. coastal modification due to man-made structures along the shoreline and beach replenishments). As well as causing habitat destruction, coastal modification may also affect rocky reef habitats by increasing the instability of the seafloor and reducing water transparency.

Continued on next page.

3 June 2016
Issue 457

[Subscribe](#) to free
weekly News Alert

Source: Guarnieri, G., Bevilacqua, S., De Leo, F., Farella, G., Maffia, A., Terlizzi, A. & Frascchetti S. (2016) The challenge of planning conservation strategies in threatened seascapes: Understanding the role of fine scale assessments of community response to cumulative human pressures. *PLOS One*. 11(2): e0149253. DOI:10.1371/journal.pone.0149253

Contact:
simona.frascchetti@unisalen.to.it,
giuseppe.guarnieri@unisalen.to.it

Read more about:
[Biodiversity](#), [Marine ecosystems](#), [Water](#)

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

1. [Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora](#)

Science for Environment Policy

Local-scale ecological assessments contribute to conservation planning in an Italian Marine Protected Area

(continued)

Other threats likely to affect rocky habitats considered included: boating traffic, reductions in [water](#) quality, and historical damage from date mussel (*Lithophaga lithophaga*) collection, which was banned in the late 1980s. Pressures potentially caused by maritime traffic were assessed using the distance of each sector from the main harbour present on the coast. Water-quality indicators were derived from data on faecal contamination of sea water collected by the Regional Agency for Environmental Prevention and Protection (ARPA). Damage from past date mussel collection was assessed for each sector by surveying five random 10 x 2 metre plots of the coastline. These surveys provided an index of rock damage ranging from no damage to complete desertification.

The study results demonstrated that different combinations of human pressures led to different communities of benthic organisms, indicating a strong link between overall human pressure and impact on marine communities. The results suggest that harbour activities, sewage discharge and alteration of sedimentation regimes (e.g. through beach replenishment), may be the main drivers of change over and beyond the general pressure related to urbanised and cultivated areas. Impacts on benthic communities included a reduction in diversity and dominance of a few opportunistic species, such as ephemeral seaweeds or mussel beds. Marine habitats with lower threat levels demonstrated greater structural diversity and species diversity.

Assessment of habitat vulnerability based on an expert opinion can be a practical solution in large-scale evaluations of the potential effect of human pressure, but may not be representative of the actual vulnerability at a local scale. The main goal of the [Marine Strategy Framework Directive](#)² is to achieve Good Environmental Status of EU marine waters by 2020; local-scale assessments of human drivers of change on biological communities may represent a way of integrating broad-scale management strategies in order to achieve sustainability in human use of marine resources.



3 June 2016
Issue 457

[Subscribe](#) to free
weekly News Alert

Source: Guarnieri, G., Bevilacqua, S., De Leo, F., Farella, G., Maffia, A., Terlizzi, A. & Frascchetti S. (2016) The challenge of planning conservation strategies in threatened seascapes: Understanding the role of fine scale assessments of community response to cumulative human pressures. *PLOS One*. 11(2): e0149253. DOI:10.1371/journal.pone.0149253

Contact:
simona.frascchetti@unisalen.to.it,
giuseppe.guarnieri@unisalen.to.it

Read more about:
[Biodiversity](#), [Marine ecosystems](#), [Water](#)

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

2. [Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy \(Marine Strategy Framework Directive\)](#)